1.0 Introduction

1.1 Foreword

This report presents the design concept for the addition of general use and High Occupancy Vehicle (HOV) lanes to Interstate 17 (I-17) from its interchange with State Route (SR) 101L to the Black Canyon City TI.

The study area is located immediately north of the Phoenix metropolitan area in south-central Arizona. The majority of the study area is located in Maricopa County (Milepost (MP) 214.0 to 241.5), with the northernmost section in Yavapai County (MP 241.5 to 244.5). The southern half of the project is in ADOT's Phoenix Construction District (MP 214.5 to 232), with the rest in the Prescott District.

The study area begins on I-17 at approximately MP 214.0, at its interchange with SR 101L, and extends north to approximately MP 244.5, the Black Canyon City Traffic Interchange (TI). In addition to the mainline widening, the study will evaluate the existing two-way frontage roads between Happy Valley Road and Carefree Highway and will recommend how best to address the long-term traffic needs in this six-mile section. The configuration of the Table Mesa TI (MP 235.9) will also be evaluated and recommendations for improvement made. A Vicinity Map detailing the study limits and the surrounding area is shown on Figure 1. A Key Map, shown in Figure 2, further details the cross roads, mileposts, existing frontage roads, and major waterway crossings.

The purpose of the study is to build consensus on how best to add capacity along the corridor, how to address existing and future frontage roads, and how to reconstruct the interchange at Table Mesa Road. The study will provide a long-range implementation strategy that will guide future decisions regarding the interim and ultimate improvements required to modify I-17 to meet the capacity and operational needs of the traveling public over the next 20 years. An Environmental Assessment is being developed in concert with this design concept study for the segment of I-17 between SR 101L and the New River TI. Implementation of the study recommendations will depend on funding availability and prioritization of roadway construction projects.

The functional classification for I-17 is Principal Arterial Interstate–Urban from MP 214.0 to 218.8 and Principal Arterial Interstate–Rural from MP 218.8 to 244.5. The posted speed limit varies from 55 mph at the south end of the corridor to 75 mph.

1.2 Purpose and Need for the Project

Interstate 17 connects Interstate 40 and Interstate 10, two of the nation's principal east-west highways. It is part of a critical north-south trade and truck route linking Mexican markets with the state's major urban centers and markets of New Mexico, Utah, and northern California. In addition to accommodating rapidly-increasing local traffic, I-17 provides the fastest and most direct route between the central parts of the state, including the Phoenix metropolitan area, and central/northern Arizona, including Prescott, Flagstaff, and several recreational and tourist attractions.

Considerable growth is expected in the corridor as reflected in a table entitled "Projected Traffic Growth" in the Traffic Forecast Report for this study. It compares 1999 Average Annual Daily Traffic (AADT) with 2020 assigned volumes in the MAG model and is duplicated in Table 1.

TABLE 1 – PROJECTED TRAFFIC GROWTH

Location	1999 AADT	2020 Assignment	Growth
At SR 101L	72,300	122,000	69%
South of Carefree Highway	55,300	114,700	107%
South of Black Canyon City	30,400	55,300	82%

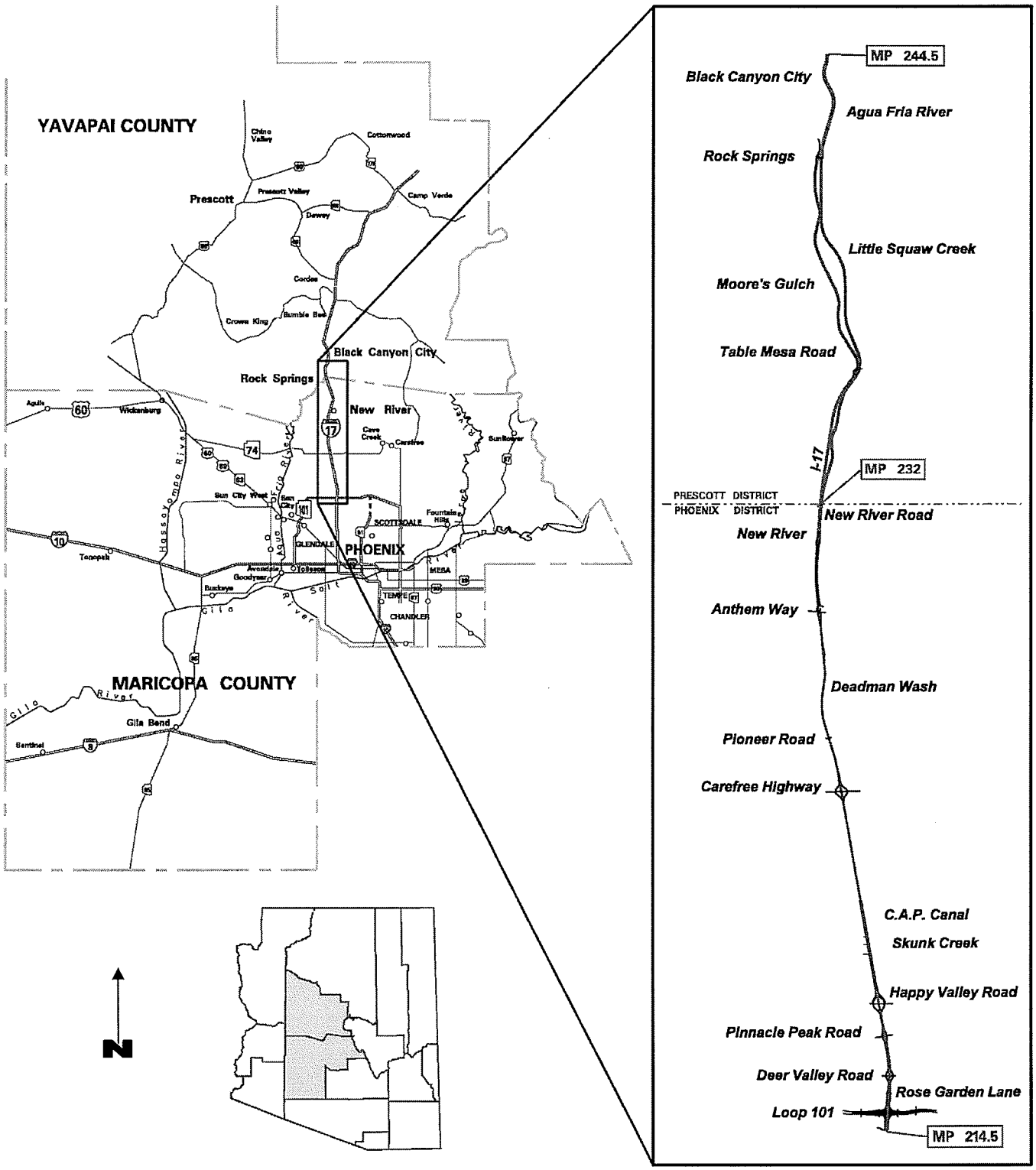

FIGURE 1 – VICINITY MAP

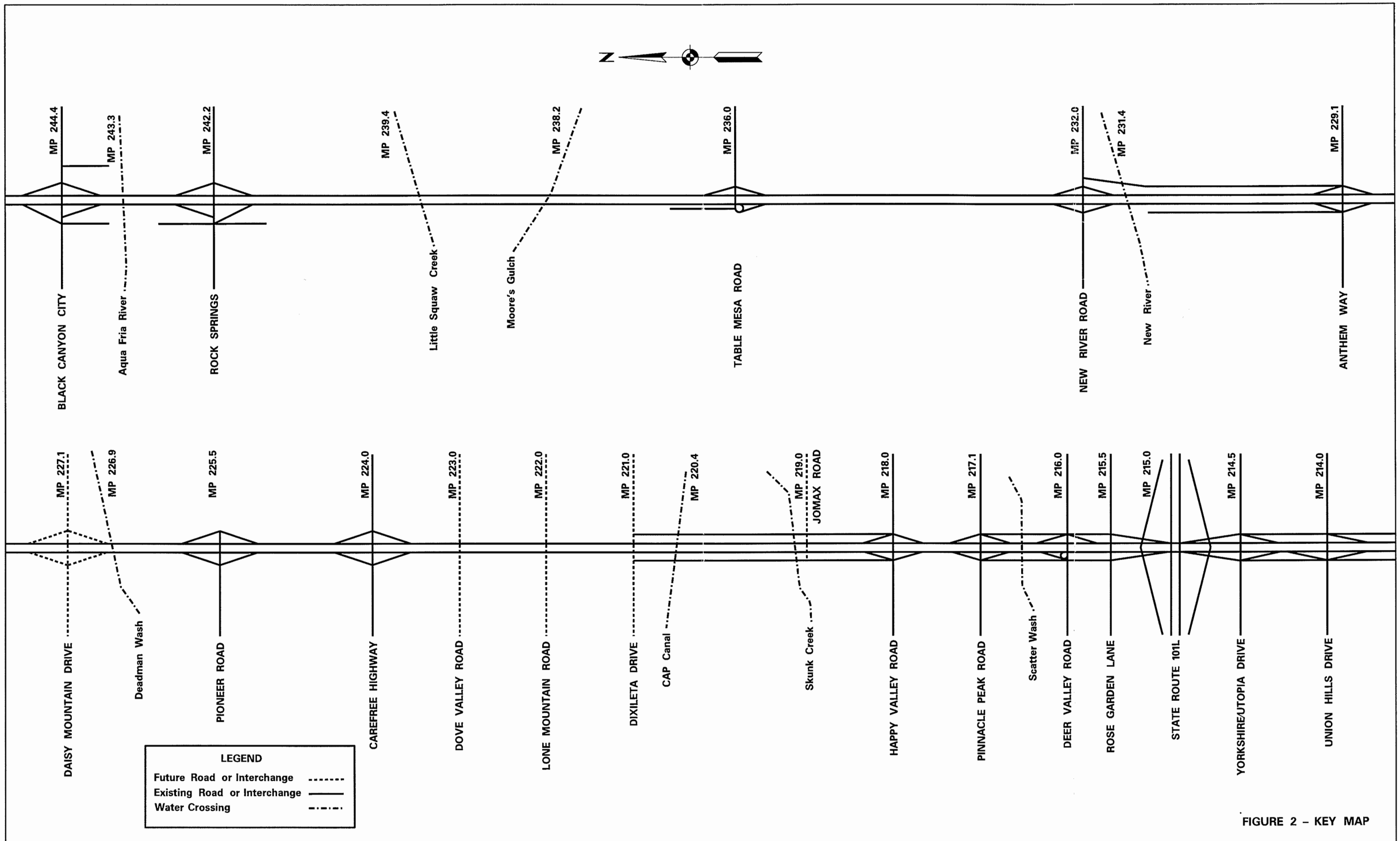

FIGURE 2 – KEY MAP

The basis for this study is the 1998 *Phoenix-Flagstaff-Page Corridor Profile Report,* which recommended a study to evaluate the addition of lanes to I-17. This study focuses on alternatives that improve capacity and operational characteristics within the corridor.

The existing highway is a four-lane divided highway from immediately north of Rose Garden Lane to Black Canyon City. The southern section of I-17 currently experiences congestion during weekday peak hours. Farther north, I-17 experiences congestion on summer weekends. As development along the corridor and to the north increases, congestion is expected to worsen.

Over time, due to increased traffic volumes, the hours of congestion along the I-17 corridor will increase. As the level of service drops along a freeway corridor, motorists tend to change their driving habits to avoid congestion and delay. In addition to trying alternate routes, drivers often shift their travel time to earlier or later. For example, as a result of the increasing volume and congestion, peak periods of travel will increase from a one and a half to two-hour peak periods to three or more hours of peak period congestion and delay.

In addition to mainline concerns, there are two-way existing frontage roads between Happy Valley Road and the Dixileta Drive alignment extended, a distance of three miles. This area is targeted for considerable residential and commercial growth over the next 20 years, which will generate local and frontage road traffic in addition to mainline traffic. This study will consider converting the frontage roads to one-way in order to improve traffic operations and the extension of the existing frontage roads three miles north to the SR 74/Carefree Highway.

The Table Mesa TI, located at MP 236, will require reconstruction to accommodate the proposed mainline widening. It is a trumpet-type interchange constructed in the 1960s. The interchange also exhibits geometric deficiencies compared to current design criteria.

The 2004-2007 Transportation Improvement Plan (TIP) for the region includes funding for the design of roadway widening from SR 101L to SR 74 in Fiscal Year (FY) 2006. ADOT's 2005-2009 Five Year Transportation Facilities Construction Program includes construction of that section in FY 2008. The reconstruction of the I-17/Carefree Highway TI is programmed for FY 2005.

1.3 Description of the Project

The project Vicinity Map (Figure 1) illustrates the limits of the study route, which begins at the I-17/SR 101L system interchange (MP 214.5) and ends at the Black Canyon City TI (MP 244.5). The project lies mostly within Maricopa County, with the northernmost three miles in Yavapai County, with a total length of 30 miles. Frontage roads were evaluated from Rose Garden Lane to Carefree Highway and the Table Mesa TI was considered for reconstruction.

1.3.1 Mainline

The Recommended Alternative consists of widening I-17 to five general use lanes and one HOV lane in each direction (5+1) from SR 101L to Carefree Highway (MP 215.5 to 224), four general use lanes and one HOV lane in each direction (4+1) from Carefree Highway to the New River TI (MP 224 to 232), and four general use lanes with no HOV lane (4+0) from the New River TI to the Black Canyon City TI (MP 232 to 244.5). 12-foot lanes will be employed throughout, with ten-foot inside and outside shoulders, two-foot offsets to barrier, and a two-foot HOV buffer.

New right-of-way will be required for the project. Property to be acquired is a combination of Arizona State Land, other agencies' land, and private land. Right-of-way will be required mostly from private owners from just north of Rose Garden Lane (MP 215.6) to Carefree Highway (MP 224), and from Anthem Way (MP 229) to the New River TI (MP 232). A total of 63 acres will need to be acquired to construct the recommended alternative.

There are 29 bridges, 32 reinforced concrete box culverts, and approximately 133 pipe culverts that will require modification with the proposed road widening. Since a majority of the mainline widening will take place to the inside of the existing lanes, filling in the existing median from SR 101L to the New River TI and, culvert extensions will be required.

Channels to carry onsite drainage will be required in many sections of the corridor, typically located between the frontage road and mainline I-17. A large, concrete-lined channel will be required to capture and convey offsite drainage along the east side of I-17 from Skunk Creek to Scatter Wash (MP 216.5 to 219.1). In addition, a retention/detention basin will be provided on the downstream side of the Scatter Wash crossing. The additional R/W for the detention basin is being acquired by ADOT in an advance acquisition to prepare for the planned drainage improvements on I-17. A three party MOU including ADOT, FCDMC and the City of Phoenix to develop and maintain the Scatter Wash detention basin as a regional flood protection facility is under negotiation.

Using as-built plans, utility plans supplied by the utility companies, and the conceptual plans developed for the I-17 widening, it appears that utility relocations and adjustments will be necessary. The most extensive utility relocation will involve the AT&T fiber optic line that runs along the existing R/W on the west side of I-17 from Happy Valley Road to Anthem Way. It appears that the portion of the line from Happy Valley Road to Carefree Highway will need to be relocated due to the acquisition of new R/W associated with constructing drainage channels and new frontage roads.

1.3.2 Frontage Roads – Rose Garden Lane to Carefree Highway

The Recommended Alternative for the frontage roads in this segment includes the eventual extension of the frontage roads three miles north to Carefree Highway and the conversion of the frontage roads to one way. The City of Phoenix has several new interchanges planned in this segment, which will dictate the timing of the conversions to one way. The City and/or adjacent developers will design and construct one-way frontage roads from Pinnacle Peak Road to Happy Valley Road, which will provide continuous one-way frontage roads from SR 101L to Carefree Highway.

The City committed to several new roadways along I-17, including one-way frontage roads from Pinnacle Peak to Happy Valley and from Dixileta to Carefree Highway. They have also planned a new north-south arterial on the 43rd Avenue alignment, which would tie into Dixileta extended west. A new TI at Dixileta is also in their plan.

Pinnacle Peak Road to Happy Valley Road (one mile)

The City of Phoenix and/or adjacent developers will provide right-of-way and design and construct one-way frontage roads in this segment.

Happy Valley Road to Jomax Road (one mile)

The City has committed to construct a new interchange at Jomax Road, after which the existing two-way frontage roads can be converted to one way between Happy Valley Road and Jomax Road. The City's proposed interchange at Jomax Road is being studied separately.

Jomax Road to Dixileta Drive (two miles)

The City of Phoenix has committed to construct a new interchange at Dixileta Drive, after which the existing two-way frontage roads to the south can be converted to one way.

Dixileta Drive to Carefree Highway (three miles)

The City of Phoenix and/or adjacent developers will provide right-of-way, design and construct one-way frontage roads in this segment. The City also plans to construct Dixileta Drive from I-17 to the west, curving northward on the 43rd Avenue alignment to Carefree Highway. In addition, the City will construct new interchanges at Lone Mountain Road and Dove Valley Road.

1.3.3 Table Mesa TI

The Recommended Alternative for the Table Mesa TI includes reconstruction of the interchange in a location approximately 600 feet south of the existing TI. The relocation allows a southbound exit ramp to be constructed in a diamond-type configuration. The reconstructed TI is recommended to be a diamond-shaped interchange, with roundabouts at the ramp/cross road intersections.

Impacts to nearby Western Area Power Administration (WAPA) transmission towers are not anticipated.

Approximately 1.5 acres of right-of-way will be required for the recommended TI alternative.

1.4 Project Objectives

The addition of lanes and additional frontage road and interchange improvements will help ADOT meet its long-range goal of providing an improved roadway from the Phoenix area to Flagstaff and beyond to the state line. Widening the roadway will lessen traffic congestion and improve the level of service.

The primary objectives of this study include the addition of mainline lanes to accommodate future projected traffic volumes. The addition of mainline lanes is anticipated to reduce congestion and travel times. The extension of frontage roads and conversion of existing two-way frontage roads to one way will provide alternate access to a long segment of I-17 in case of crashes blocking the mainline, while maintaining local access to adjacent residences and businesses.

1.4.1 Public Involvement

To ensure that the community had ample opportunity to provide comments and be involved in the development and evaluation of alternatives, this study has included an extensive public involvement process with public meetings, question and answer sessions, newspaper advertisements, and a project web site.

1.4.1.1 Scoping

The purpose of the scoping process is to identify potential issues, concerns, and opportunities (ICOs) to be considered in the Design Concept Study and the EA for the proposed improvements. This scoping information was obtained from area residents, business owners, and government agency representatives through public and agency scoping meetings.

An agency scoping meeting was held on January 6, 2000, at 10:00 a.m. at ADOT. The agency scoping meeting was attended by representatives of BLM, FHWA, ASLD, ADOT Phoenix Construction District, ADOT Regional Traffic, MCDOT, Maricopa County Planning, Maricopa County Sheriff's Office, City of Phoenix Planning, City of Phoenix Police, Deer Valley Unified School District, and three utility companies. Numerous ICOs were discussed during the meeting, but those most emphasized were accommodating future interchanges, emergency vehicle access, frontage roads, rapidly growing congestion, timing of environmental studies, protection of natural and cultural resources, utility impacts and relocations, and roadway safety.

The public scoping meeting for the study was held on January 6, 2000. The meeting was held at 5:30 p.m. at the New River Elementary School Cafeteria.

The public scoping session provided an opportunity for those in attendance to identify issues and express concerns about the existing roadway characteristics, as well as to suggest various improvements which could be considered by the study team. The ICOs discussed at the public meeting generally focused on congestion, rapid development, frontage roads, traffic interchanges, and emergency alternative routes.

1.4.1.2 Public Information Meetings

A Public Information Meeting was held on April 10, 2001, at the Deer Valley Community Center, 2001 W. Wahalla Lane, Phoenix, Arizona, beginning at 6:00 p.m. Specific topics covered at the meeting included a description of the analyses conducted to date for the project, a review of the traffic report findings, a presentation of the recommended improvement alternatives for mainline I-17 and the Table Mesa TI, a discussion of alternatives for the Loop 101/I-17 interchange area, a brief discussion of the Carefree Highway TI, the environmental issues associated with the project, and an update on the project schedule. The format of the meeting was an informal "open house" which included exhibits for public viewing, a slide presentation, project information provided by the Study Team members, and a question and answer session, which concluded the meeting. Study team members were available before and after the presentation to answer questions.

An additional Public Information Meeting was held on July 25, 2002, at the Deer Valley Community Center. The purpose of the meeting was to provide information and solicit public comments regarding the proposed widening of I-17 from the SR 101L TI to Black Canyon City and improving the Table Mesa Road TI. Notice of the meeting was provided in the *Arizona Republic* and in the *Desert Advocate*. The meeting was an informal open house with exhibits of the proposed improvements, a slide presentation, and a question and answer session. ADOT, FHWA, and study consultant representatives were available to provide project information and answer questions. A packet including reduced-scale diagrams of the meeting exhibits and comment sheet was handed out at the entrance to the meeting. Sixty-four people signed in at the meeting. The presentation included descriptions of the analyses conducted to date for the project and the recommended improvement alternatives for mainline I-17, I-17/SR 101L interchange area, frontage roads, and the Table Mesa TI. In addition, a brief discussion of the Carefree Highway TI alternatives was included, along with the environmental issues associated with the project and an update on the project schedule. Also, the portions of the study area covered by the Design Concept Report and the Environmental Assessment were outlined.

1.4.1.3 Public Hearing

A Public Hearing was held at the Deer Valley Community Center on November 5, 2003, from 6:00 to 8:00 p.m. The purpose of the hearing was to present the preferred alternative for improving mainline I-17 from SR 101L to New River Road and to receive public comments on the proposed improvements. The hearing was advertised in the *Arizona Republic* and the *Desert Advocate*. Prior to the hearing, the Draft Environmental Assessment was available for public review at the Juniper Branch of the Phoenix Public Library, at the New River Elementary School, and on the project web site.

The meeting was an open house with exhibits of the preferred alternative located throughout the room. FHWA, ADOT, local government, and consultant representatives were available to answer questions. A presentation was given at 6:30 p.m. The presentation began with an explanation of the study process and how it had progressed since the last public information meeting. The

preferred alternative was described in detail and an overview of the environmental impacts was given. The floor was then opened for a question and answer session. The hearing proceedings were recorded by a court reporter. The court reporter was available to record comments following the question and answer session, and information packets including a comment sheet were provided to offer opportunities for the public to provide comments to the study team.

One hundred persons signed in at the hearing. Eighteen comments were received following the public hearing. Most comments were in favor of the proposed improvements, but included concerns regarding the project schedule, traffic control during construction, implementation of frontage roads, and related traffic interchange studies.

1.4.1.4 Web Site

Public involvement has also been encouraged during the course of the study through the use of a project web site offering study information and an additional means of providing feedback to the study team. The web site address is http://www.i17wideningstudy.com.

1.5 Characteristics of the Corridor

Interstate 17 extends north from Jct. I-10 in central Phoenix to its northern terminus in Flagstaff, connecting I-10 to I-40.

The functional classification for I-17 is Principal Arterial Interstate–Urban from MP 214.5 to 218.8 and Principal Arterial Interstate–Rural from MP 218.8 to 244.5. The existing Phoenix metropolitan area "urban boundary" is located at approximately Happy Valley Road (MP 218).

Table 2 lists the previous projects constructed within the study section, sorted by beginning milepost.

TABLE 2 – PREVIOUS PROJECTS WITHIN THE STUDY AREA

Project No.	Beg. MP	End MP	Constr. Date	Description
I 17-1(123)	208	220.5	1982	
I 17-1-984	209.9	220.4	1979	Thunderbird - Happy Valley (FRT) Seal Coat
S-39(2)	213	218.72	1947	BST
I 17-1-916	213.4	230.5	1968	Bell Road - New River Seal Coat
I 17-1-929	213.4	241.6	1970	Bell Road - Yavapai County Line Seal Coat
I 17-1(41)	213.5	216.54	1963	AC Pavement
IM 17-1(212)	214.7	226	1993	Mill, Replace ACFC
RAM 600-0-506	215.5		1993	Loop 101 & I-17 Interchange
RAM 600-0-519	215.5	216.58	1993	Loop 101 & I-17 TI Const Package 6E
IM 17-1(220)	216	280	??	Pinnacle Peak Road - Cherry Road Sign Update
I 17-1(42)	216.5	220.48	1963	AC Pavement
NH 17-1(325)	216.61			Phoenix - Cordes Junction Hwy I-17 - Deer Valley Road N-Var Mes
LSI 17-1(77)	216.7	233.95	1968	Deer Valley - Black Canyon TI Landscaping
F 003-2(58)	217	229.7	1957	Phoenix - Cordes Junction Hwy Seal Coat
NI 003-2-58A	217	229.7	1957	Skunk Creek Bridge – North Seal Coat
I 17-3-904	217.1		1982	Pinnacle Peak TI Underpass Bridge Repair
I-107-1(107)	217.1		1972	Pinnacle Peak TI Lighting
STP 017-1(348)P	218		2000	Phoenix - Cordes Hwy I-17 – Happy Valley Rd TI Construct Roundabouts

Project No.	Beg. MP	End MP	Constr. Date	Description
S 39(3)	218.7	225.1	1947	BST
I 17-3-914	219.1	219.1		Skunk Creek Bridge South Bound Structure # 219
I 17-1(51)	219.5	220	1962	Skunk Creek and CAP Bridges
I 17-1(136)	220.5	236.62	1981	Resurfacing
I 17-1(56)	220.5	225.08	1963	AC Pavement
NS 39(51)A	220.5	234.5	1950	Phoenix - Rock Springs Seal Coat
I 17-1(29)22	220.7	233.1	1963	AC Pavement
I 17-3-907	223.9		1982	Carefree Hwy TI Underpass Bridge Repair
IR 17-1(149)	225	238	1983	AC Overlay
I 17-3-905	225	225	1982	Pioneer TI Underpass Bridge Repair
I-17-1(57)	225.1	230.57	1964	AC Pavement
FAS-39(1947)	225.1	230.6	1947	Grading & Paving
NS 39(47)A	225.1	231.88	1948	BST
MA 17-1(226)	226	232	1994	Overlay NB & SB Lanes
I-17-1(74)	226.95		1967	
I-17-1(159)	227		1980	Deadman Wash Bridge Maintenance
I 17-3-993	227	227	1979	Deadman Wash Bridge Scour Protection
I 17-1-957	227.8	227.8	1974	Desert Hills R.A. Sub-Surface and Filter
NI 17-1-501	228.5	234.5	1961	Bell Road - Yavapai County Line Seal Coat
I-17-1-549	229	229	1999	Anthem Way TI
NS 39(55)A	229	236	1954	New River - Table Mesa Seal Coat
I 17-1-951	229.1	233.1	1974	Desert Hills - New River Seal Coat
I 17-1(61)	230.5	236.33	1966	AC
I 17-1(120)	230.7	233.3	1976	New River TI Signing
I-17-1(994)	231.4		1980	New River Bridge Maintenance
NS 39(48)A	231.9	231.92	1948	Bridge & Abutments
I-17-1(113)	232	232	1973	New River TI Lighting
IM 17-1(329)	232	238.6		Phoenix - Cordes Junction Hwy (I-17) - New River - Moores Gulch
N 900-0-538	232			Prescott District I-17 Minor TI Improvement Program
S 39(4)	232.1	236.55	1949	BST
S 39(5)	236.6	239.66	1950	GD
S 39(6)	236.6	242	1950	BST
I 17-1(83)	236.6	251.6	1984	Table Mesa TI - Sunset Point TI Permanent Signing
NF 156(56)A	236.6	241.8	1955	New River - County Line Seal Coat
I 17-1(62)	236.8	243.11	1965	AC Pavement
ER 17-1(224)	238	240	1993	Bank Protection/Spur Dyke Str
IR 17-1(153)	238	244	1984	AC&ACFC
ER-17-1-(224)	238.2	239.55	1995	Scour Protection at Moores Gulch and Little Squaw Creek
IM 17-1(342)	238.55	245		Phoenix - Cordes Junction Hwy (I-17) - Moores Gulch - Black Canyon - MI
I 17-1-971	239.5		1975	SB REPAIR
I 17-3-911	239.5		1984	SB REPAIR
I 17-1-905	241.8	251.6	1965	Maricopa County Line - North Seal Coat
I 17-1-907	242		1965	North CMP for Access Road
I 17-1(70)	242.1		1969	Rock Springs TI Lighting

Project No.	Beg. MP	End MP	Constr. Date	Description
I 17-1(37)	242.3	244.93	1964	NORTH GD
I 17-1(59)	242.3	244.93	1964	NORTH BC AC
I 17-1(67)	242.5		1965	Grade Separation/Structures
I 17-1-924	242.5	253	1969	Rock Springs - Cordes Junction Seal Coat
ER 17-1-988	243.3	243.5	1979	Agua Fria River Bridge – Demol (strm) 12/78 See (139)
I 17-1-989	243.3	243.3	1979	Agua Fria River Bridge 12/78 Flood Detour
ER 17-1(139)	243.4		1979	Flood Damage
IR 17-1(159)	244	250	1985	ACFC
IR 17-1(168)	244	250.6	1989	REMOVE /REPLACE

1.5.1 Roadway Characteristics

This project is divided into several sections for consideration of the separate project elements:

- Widening of I-17 at SR 101L TI
- I-17 mainline widening – SR 101L TI to New River TI (MP 214.5 to 232.0)
- I-17 mainline widening – New River TI to Black Canyon City TI (MP 232.0 to 244.5)
- Frontage Roads – Rose Garden Lane to Carefree Highway
- Reconstruction of I-17/Table Mesa TI

I-17 Mainline Widening

The southern limit of the study is the I-17/SR 101L traffic interchange. Through the limits of the TI, I-17 consists of two lanes in each direction, an HOV lane in each direction, and auxiliary lanes. The HOV lanes are tapered out near Rose Garden Lane, just north of SR 101L.

North of the SR 101L TI, I-17 is a four-lane divided highway constructed on relatively level, but rising, terrain with a posted speed of 55 miles per hour (mph). The speed limit rises to 65 mph at the Phoenix urban boundary just north of Deer Valley Road (MP 216) and to 75 mph just north of Happy Valley Road (MP 218). North of Carefree Highway (MP 224), the highway enters rolling terrain.

From SR 101L to the New River TI (MP 232), the terrain is level or gently rolling and a 60- to 76-foot median separates the parallel northbound and southbound lanes. North of the New River TI, the northbound and southbound roadway alignments diverge widely for approximately 10 miles, and converge again north of the Rock Springs TI (MP 242.5±) to Black Canyon City.

Mainline lane widths are 12 feet, with 10-foot outside shoulders and 4-foot inside shoulders (Figures 3 and 4). The existing highway cross slope is 2.0% from approximately MP 214.5 to 215.7 and 1.5% from MP 215.7 to 244.5. The southbound roadway between Rose Garden Lane and Black Canyon City was the original two-way highway and was constructed with a parabolic crown rather than a straight left-to-right cross slope.

The existing pavement is concrete through the I-17/SR 101L TI, changing to asphalt just north of Rose Garden Lane (MP 215.7) and continuing to Black Canyon City.

Existing and proposed traffic interchanges and significant features along I-17 are noted in Table 3.

FIGURE 3 – TYPICAL SECTIONS – EXISTING CONDITION

EXISTING CROSS SECTION I-17 FROM NORTH OF CAP CANAL TO CAREFREE HIGHWAY

STA 1040+00 TO 1223+00
I-17 LOOKING NORTH

EXISTING CROSS SECTION I-17 FROM CAREFREE HWY TO NEW RIVER TI

STA 1223+00 TO 1647+00
I-17 LOOKING NORTH

FIGURE 4 – TYPICAL SECTIONS – EXISTING CONDITION (CONT.)

TABLE 3 – ROADWAY CHARACTERISTICS ALONG I-17

I-17 CROSSING	MP	COMMENTS
Yorkshire Drive TI	214.5	
I-17 / SR 101L TI	214.9	Mainline currently consists of two through lanes + HOV lane; 55 mph
Rose Garden Lane TI	215.5	
	215.5	Existing one-way frontage roads Rose Garden Lane to Deer Valley TI.
Deer Valley Road TI	216.0	TI (cross road) improvements are programmed for 2005.
	216.0	Existing one-way frontage roads Deer Valley TI to Pinnacle Peak TI.
Scatter Wash	216.6	Existing twin 8' x 7' box culvert. Posted speed increases to 65 mph.
Pinnacle Peak Road TI	217.1	Construct slip ramps mainline to frontage roads on south side of TI; construction complete Summer 2002.
Happy Valley Road TI	218.0	Roundabouts: interim TI reconstruction completed 2001.
	218.0	Existing two-way frontage roads from Happy Valley Rd to Dixileta Dr. alignment (approximately 3 miles).
Proposed Jomax Road TI	218.9	New TI on Jomax Road alignment proposed by City of Phoenix currently being studied. Possible construction 2006.
Skunk Creek Bridges	219.1	Posted speed increases to 75 mph
CAP Bridges	220.4	
Two or three possible future TIs		Proposed by City of Phoenix near Dixileta (MP 220.9), Lone Mountain (MP 222.0), and/or Dove Valley Roads (MP 223.0). Lone Mountain Road is currently the preferred alternative for the Loop 303 alignment; the Loop 303 study is underway.
Carefree Highway TI	224.0	Existing spread diamond. Separate DCR being prepared. TI reconstruction is programmed for FY 2005.
Pioneer Road TI	225.5	Possible future TI reconstruction by Del Webb
Daisy Mountain TI	227.0	Construction completed 2003.
Rest Areas (closed to public)	227.9	Permanently closed.
Anthem TI	229.1	Recently reconstructed TI.
	229.1	Existing two-way frontage roads Anthem TI to New River TI (west frontage road ends south of New River Bridge).
New River Bridges	231.4	
New River Road TI	232.0	Alignment is bifurcated to north.
ADOT Phoenix/Prescott District Line	232 (approx)	
Table Mesa Road TI	236.0	Existing TI is "trumpet" type with loop ramp in SW quadrant.
Moore's Gulch Bridges	238.4	
Little Squaw Creek Bridges	239.4	
Maricopa/Yavapai County Line	241.5 (approx)	
Rock Springs TI	242.1	
Mud Springs Grade Separation	243.0	
Agua Fria River Bridges	243.4	
Black Canyon City TI	244.4	

I-17 / SR 101L TI

The I-17/SR 101L TI is a system interchange connecting two major Phoenix-area freeways. I-17 is a major north-south freeway connecting I-10 in central Phoenix to I-40 in Flagstaff in northern Arizona. SR 101L extends from I-10 near the 99th Avenue alignment, north to approximately the Beardsley Road alignment, where it curves to the east. The alignment then continues east to approximately the Pima

Road alignment, where it curves to the south and extends to its ultimate intersection with SR 202L south of Chandler Boulevard.

The I-17/SR 101L interchange was constructed in the 1990s, with the final ramps opened to traffic in 2000. It is a fully-directional interchange with one-way frontage roads parallel to SR 101L. Northbound and southbound I-17 cross above SR 101L with three-span structures over SR 101L and the South Frontage Road (SFR) and one-span structures over the North Frontage Road (NFR). Directional flyover ramps, eastbound to northbound (E-N), southbound to eastbound (S-E), westbound to southbound (W-S), and northbound to westbound (N-W), cross above I-17.

There are diamond interchanges south and north of the I-17/SR 101L TI. The southern ramps at Yorkshire/Utopia and the northern ramps at Rose Garden Lane connect to frontage roads.

In the northbound I-17 direction, two lanes plus an HOV lane (2+1) currently exist south of Yorkshire/ Utopia, through the main body of the TI, and north of Rose Garden Lane, with auxiliary lanes added between entrance and exit ramps.

On southbound I-17, there are currently two lanes plus an HOV lane (2+1) north of Rose Garden Lane and through the main body of the TI, with auxiliary lanes added between entrance and exit ramps. The E-S and W-S directional ramps combine and add three lanes to the existing 2+1 section for a short distance near Yorkshire/Utopia, tapering to the south. Through the TI, lanes are twelve feet wide with eight-foot inside shoulders, ten-foot outside shoulders, and two-foot offsets to barrier.

I-17 is relatively flat through the interchange area, with grades of 0.33% to 0.46%.

Four bridges carry mainline I-17 over SR 101L and its associated frontage roads. The two southerly three-span structures cross the eastbound SFR, eastbound SR 101L, and westbound SR 101L. The two northerly 1-span structures cross the westbound NFR. All four bridges are cast-in-place post-tensioned prestressed concrete box girders with a structure depth of 7'-3". They can be characterized as follows:

Structure #02180
Feature On: **I-17 SB**
Feature Under: **NFR**
Spans: **1**
[140']
Min Vert Clr: **20.0'**
Taper @ west edge

Structure #02181
Feature On: **I-17 NB**
Feature Under: **NFR**
Spans: **1**
[140']
Min Vert Clr: **17.9'**
Taper @ east edge (partial)

Structure #02178
Feature On: **I-17 SB**
Feature Under: **SR 101L**
Feature Under: **SFR**
Spans: **3**
[157'+183'+132']
Min Vert Clr: **17.1' (SR 101L)**
Min Vert Clr: **18.0' (SFR)**
Uniform width

Structure #02179
Feature On: **I-17 NB**
Feature Under: **SR 101L**
Feature Under: **SFR**
Spans: **3**
[153'+183'+132']
Min Vert Clr: **16.7' (SR 101L)**
Min Vert Clr: **17.2' (SFR)**
Taper @ east edge

The south span of the three-span southbound bridge is about four feet longer than the northbound bridge because of the skew alignment of the undercrossing SFR.

Transversely, the southbound and northbound dual bridges are separated by an open median with about 20 feet clear between edges of deck. Longitudinally, the southerly three-span bridges are separated from the northerly one-span bridges by about 180 feet of roadway.

The southbound lanes have a 50:1 taper along the west edge that affects Structure Number 2180, but ends north of Structure Number 2178. The northbound lanes have a 50:1 taper along the east edge that affects Structure Number 2179, and a short portion of Structure Number 2181.

Frontage Roads

Frontage roads exist on both sides of I-17 between Rose Garden Lane and Pinnacle Peak Road, from Happy Valley Road three miles north to the Dixileta Drive alignment extended, and from Anthem Way to the New River TI (the west frontage road currently ends south of the New River). Existing frontage road widths are typically 26 feet. Frontage roads are one way from Rose Garden Lane to Deer Valley Road and from Deer Valley Road to Pinnacle Peak Road and are two way elsewhere along the corridor. All frontage roads are two lanes wide with the exception of a portion of the west frontage road north of Happy Valley Road (MP 219.4 to 220.4), where a third lane has been added to accommodate turns into a residential development.

I-17 / Table Mesa TI

The Table Mesa Traffic Interchange is located at MP 235.94 on I-17 approximately six miles north of the town of New River.

Table Mesa Road provides access for a small number of residences and businesses east and west of I-17, including a ranch property about one mile east of the TI. The Table Mesa TI is predominantly utilized for residential and agricultural access with some recreational traffic. East of I-17, Table Mesa Road becomes Forest Service Road 41, which extends to the Seven Springs area. To the west, Table Mesa Road runs toward the Lake Pleasant Park. Both roads are unpaved.

The Table Mesa TI was constructed in 1968. It is a trumpet-type interchange with southbound I-17 traffic exiting via a loop ramp and with diamond ramps on the east side of I-17. Table Mesa Road crosses above the I-17 mainline via separate structures over the northbound and southbound lanes. The northbound and southbound roadways, both 38 feet wide, are separated by a 175-foot median consisting primarily of rock. Horizontal and vertical control for the northbound and southbound roadways are independent; the roadway profiles differ by as much as five feet through the TI area.

The ramp intersections with the crossroad are stop-sign controlled. There is no existing street lighting at the TI.

An AASHTO Controlling Design Criteria Report was prepared for the TI and identified several geometric deficiencies. The major geometric issues are associated with the loop ramp for the southbound (SB) exit and the mainline sight distance approaching that ramp. The crest of a vertical curve is located just north of the SB exit ramp, limiting sight distance and causing abrupt exit movements from the mainline.

December 1999 traffic counts reflect relatively low volumes on the Table Mesa crossroad and ramps. Only the northbound exit ramp exceeded 100 vehicles per day (vpd).

A number of topographic and manmade features restrict options for reconstruction of the interchange at its present location. Table Mesa Road west of the TI, called the *west frontage road* in this report to differentiate it from Forest Road 41 or *east frontage road*, is used to access properties to the west and closely parallels I-17 for approximately one-half mile before departing to the northwest. Large electrical transmission towers are present in the northwest and southeast quadrants of the TI; electrical lines are

carried across I-17 almost directly over the TI. The northwest transmission tower sits atop a steep hill. A rock outcropping, which separates the two existing bridges, lies within the median through the interchange. The New River floodplain runs alongside the existing I-17 embankment southeast of the TI.

1.5.2 Land Use

The existing land uses along the study corridor consist of a mixture of commercial, residential, recreational, and undeveloped lands that are privately or publicly owned. The southern section of the project area between the SR 101 TI and the Central Arizona Project (CAP) Canal is mostly urban, developed land, with the density of development decreasing in a northerly direction. Several mobile home parks are located near Deer Valley Road, and single-family residences are located west of I-17, north of Happy Valley Road. Other key features include the Adobe Mountain Juvenile Institute and a city-operated landfill west of I-17, as well as the USAA office complex east of I-17 near Happy Valley Road.

From the CAP Canal to Carefree Highway, undeveloped State Trust Land is located on both sides of the freeway. The middle section of the project area, which includes the area north of Carefree Highway to New River, is largely undeveloped and rural in nature. This area is comprised mostly of grazing lands and undeveloped lands. Some residences and commercial properties are also present. However, this area is growing and an increasing number of residential and commercial properties are becoming established, including the new Tramonto development at Carefree Highway and the Anthem development along Anthem Way. The Ben Avery Shooting Range and Recreation Area is located to the northwest of the Carefree Highway TI.

The northern section of the project area, which includes the area north of New River Road to Black Canyon City, is largely undeveloped and rural in nature. This area is comprised mostly of grazing lands and undeveloped lands. Some residences and commercial properties are also present. However, this area is growing and an increasing number of residential and commercial properties are becoming established.

The Agua Fria National Monument was recently established to the north of the project limits. Although this project should not impact the monument, future projects to the north will need to consider its presence.

1.5.3 Drainage

In addition to the bridge crossings at washes and the CAP canal, the drainage facilities along the I-17 corridor range from small-diameter corrugated metal pipe culverts to multi-cell reinforced concrete box culverts (RCBC). There are approximately 35 reinforced concrete box culverts and 162 corrugated metal or reinforced concrete pipe culverts from SR 101L to the Black Canyon Traffic Interchange. Other existing drainage features include catch basins connected to small diameter pipe to drain median areas.

The watershed contributing to the site generally originates in the hills and mountains to the northeast of the roadway. The drainage typically flows in a southwest direction and first crosses the northbound lanes of I-17 and then the southbound lanes. There are some drainage basins that originate in the area to the west of I-17 beginning half a mile north of the New River TI. These basins flow in a southeasterly direction crossing I-17 and then reversing direction and crossing the roadway again flowing southwest. Slopes range from 1% in the lower alluvial areas to approximately 25%.

Rock outcrops interspersed with shallow deposits of sandy loams overlying bedrock characterize the upper steeper portion of the watershed. The lower watershed soils are made up of alluvial materials washed down from the surrounding hills. Gravelly/sandy loam soils make up much of this area.

Vegetation is sparse (approximately 10-20%) and representative of the Sonoran desert region. Species noted within the project limits included Palo Verde, Mesquite, Saguaro cacti, Cholla, and Prickly Pear cacti. Desert shrubs such as greasewood and desert grasses constitute an additional percentage of the vegetative cover.

The southern portion of the watershed is undergoing rapid urbanization. Several large-scale commercial and residential developments have been planned/constructed (Tramonto, USAA, etc.). Numerous vacant parcels adjacent to the highway have been or are being developed at the current time.

Between SR 101L and Carefree Highway, the existing onsite drainage scheme is to provide retention/detention in the median areas and to provide intermittent culverts to route flow across the corridor. The west side of the highway sheet flows to the adjacent property. Drainage on the east side of the highway flows in a small swale along the right-of-way to a cross culvert and outlets to the west side.

The existing offsite drainage scheme in this segment provides a "pass through" system for offsite storm water. Cross culverts were located periodically throughout the corridor to allow flow to cross I-17. The two largest crossings are Skunk Creek and Scatter Wash. The remaining crossings typically consist of small diameter pipe culverts.

Table 4 lists the major culverts (48 inches in diameter or greater) along I-17 within the project limits.

TABLE 4 – EXISTING MAJOR PIPES AND BOX CULVERTS

Culvert ID No.	Approx. Milepost	Station		Skew	Culvert Size	Type	Length (feet)
	214.49	720+93	SB	0 RT	50"X31"	CMPA	258
	215.19	758+00	NB	0 RT	2-43"X27"	CMPA	309
	215.37	767+48	NB	0 RT	36"X22"	CMPA	258
	215.49	774+00	SB	0 RT	50"X31"	CMPA	264
	215.83	791+80	SB	0 RT	65"X40"	CMPA	353
	216.11	806+59	NB	0 RT	6'X3'	RCBC	80
	216.24	814+00	NB		65"X40"	CMPA	226
	216.57	831+00	NB	0 RT	6' X 7'	RCBC	275
11A	216.74	840+00	NB	0 RT	2-8' X 7'	RCBC	267
17	223.18	1179+92	NB	30 LT	2-10'X5'	RCBC	224
29	224.55	1252+55	NB	0	3-8'X7'	RCBC	194
30	224.96	1273+86	NB	30 RT	6'X7'	RCBC	228
33	225.20	1286+70	NB	40 LT	6'X5'	RCBC	274
44	226.07	1332+45	NB	0	6'X7'	RCBC	193
60	227.35	1400+35	SB	30 RT	2-8'X6'	RCBC	218
75	229.46	1511+50	NB	45 LT	2-6'X5'	RCBC	369
82	230.51	1567+27	NB	0	6'X4'	RCBC	277
84	230.85	1585+61	NB	0	6'X4'	RCBC	251
90	231.20	1604+20	NB	11 RT	2-10'x7'	RCBC	201

Culvert ID No.	Approx. Milepost	Station		Skew	Culvert Size	Type	Length (feet)
96	232.17	1655+15	NB	20 RT	60"	CMP	348
98	232.47	1670+90	NB	45 RT	2-10'X8'	RCBC	201
99	232.54	1674+50	SB	45 RT	2-10'X8'	RCBC	199
101	233.03	1700+60	NB	30 RT	10'X8'	RCBC	134
102	233.16	1708+07	SB	30 RT	10'X8'	RCBC	198
106	233.72	1738+30	SB	0	48"	CMP	186
107	233.83	1744+40	NB	30 RT	2-10'X8'	RCBC	95
108	233.88	1747+05	SB	0	2-10'X8'	RCBC	125
112	234.42	1775+70	NB	0	2-8'X7'	RCBC	107
113	234.46	1777+95	SB	0	10'X10'	RCBC	167
123	235.56	1835+95	SB	30 RT	6'X7'	RCBC	134
124	235.56	1836+20	NB	0	6'X7'	RCBC	87
130	236.35	1876+30	SB	30 RT	6'X4'	RCBC	169
139	236.78	1897+37	SB	30 RT	60"	CMP	112
140	236.81	1898+70	SB	0	78"	CMP	104
141	236.75	1898+90	NB	0	72"	CMP	223
143	236.88	1906+60	SB	0	48"	CMP	120
147	237.09	1917+00	SB	0	60"	CMP	136
148	237.11	1918+10	NB	30 LT	60"	CMP	212
153	237.37	1932+00	NB	0	10'X3'	RCBC	55
155	237.65	1946+60	NB	0	48"	CMP	230
163	238.08	1969+55	NB	0	72"	SPP	216
164	238.18	1974+75	SB	0	84"	CMP	140
165	238.41	1987+00	NB	0	48"	CMP	136
167	238.59	1996+25	NB	0	3-10'X10'	RCBC	142
168	238.82	2008+70	NB	0	10'X4'	RCBC	49
170	239.11	2023+56	SB	0	84"	CMP	134
171	239.61	2050+00	NB	30 RT	78"	CMP	180
172	239.64	2051+65	SB	0	8'X7'	RCBC	104
173	239.68	2053+86	NB	0	10'X10'	RCBC	151
175	239.81	2060+53	NB	43 LT	60"	CMP	307
183	240.37	2090+47	NB	21 LT	54"	CMP	200
184	240.47	2095+50	SB	0	60"	CMP	90
190	240.70	2107+50	NB	30 LT	10'X10'	RCBC	114
191	240.76	2110+65	SB	12 LT	8'X7'	RCBC	92
196	241.12	2131+95	SB	0	48"	CMP	84
201	241.23	2140+05	SB	15 RT	48"	CMP	163
208	241.67	2152+71	SB	23 LT	48"	CMP	104
209	242.01	2152+93	SB	30 LT	2-10X8'	RCBC	143
212	241.83	2167+35	NB	0	6'X6'	RCBC	110
214	241.95	2173+75	NB	30 LT	2-10'X8'	RCBC	169
215	242.14	2183+50	MD	45 RT	60"	CMP	511
216	242.27	2190+64	MD	15 RT	48"	CMP	263
226	244.76	2309+06	MD	0	6'X7'	RCBC	267

1.5.4 Utilities

Major existing utilities in the I-17 corridor are presented in Table 5:

TABLE 5 – EXISTING UTILITIES

AT&T Fiber Optic	
Utility Type	**Location**
Fiber Optic (1 ¼ " inner duct)	From SW quadrant of Happy Valley Road paralleling west R/W line north around Carefree Highway TI to just north of the Pioneer Road TI.
Fiber Optic (1 ¼ " inner duct)	The line lies west of I-17, turning west along Anthem Way and then running north, paralleling Lake Pleasant Road to New River, then paralleling the gas pipeline north.
Fiber Optic (1 ¼ " inner duct)	Crosses I-17 SB at Sta 2015+75 (MP 238.96)
Fiber Optic (1 ¼" inner duct)	Crosses I-17 NB at Sta 2054+20 (MP 239.69)
Fiber Optic (1 ¼ " inner duct)	Along east R/W line from Sta 2057+00 to Sta 2107+25 (MP 239.74 to 240.69)
Fiber Optic (1 ¼ " inner duct)	Crosses I-17 NB at Sta 2107+25 (MP 240.69)
Fiber Optic (1 ¼ " inner duct)	Crosses I-17 SB at Sta 2115+50 (MP 240.85)
Fiber Optic (1 ¼ " inner duct)	Along west R/W line from Sta 2115+50 to Sta 2186+00 (MP 240.85 to MP 242.18)
Arizona Public Service	
Utility Type	**Location**
Underground Power	South of Loop 101 to Rose Garden Lane; approx. 110' west of I-17 median centerline
Overhead Power	Crosses I-17 at Rose Garden Lane
Overhead Power	Crosses I-17 at Sta 896+25 (MP 217.80)
Overhead Power	Crosses I-17 at Sta 959+28 (MP 219)
Overhead Power	Crosses I-17 at Sta 978+05 (MP 219.36)
Overhead Power	Crosses I-17 at Sta 1002+55 (MP 219.82)
Overhead Power	Crosses I-17 at Sta 1105+80 (MP 221.79)
Overhead Power	Crosses I-17 at NB Sta 1273+94 (MP 224.94) and SB Sta 1276+15 (MP 225.0)
Overhead Power	Crosses I-17 at Sta 1305+00 (MP 225.55)
Overhead Power	Crosses I-17 at NB Sta 1394+82 (MP 227.24) and SB Sta 1394+13 (MP 227.23)
Underground Power	Crosses I-17 at NB Sta 1434+07 (MP 227.99)
Underground Power	Underground line runs in median from Sta 1434+07 (MP 227.99) to Sta 1446+27 (MP 228.22)
Underground Power	Crosses I-17 at SB Sta 1446+27 (MP 228.22)
Underground Power	Crosses I-17 at Sta 1485+50 (MP 229.00)
Underground Power	Crosses I-17 at Sta 1492+20 (MP 229.09)
Underground Power	Crosses I-17 at Sta 1498+47 (MP 229.21)
Overhead Power	Crosses I-17 at NB Sta 1502+40 (MP 229.29) and SB Sta 1500+50 (MP 229.24)
Overhead Power	Crosses I-17 at Sta 1531+00 (MP 229.80)
Overhead Power	Crosses I-17 at Sta 1611+90 (MP 231.35)
Overhead Power	Crosses I-17 just south of New River Road TI
Overhead Power	Crosses I-17 at NB Sta 1881+50 and SB Sta 1876+00 (MP 236.42 and MP 236.31)
Overhead Power	Crosses I-17 at SB Sta 1991+55 and NB Sta 2007+47 (MP 238.50 and MP 238.80)

Western Area Power Administration	
Utility Type	**Location**
Transmission Tower	Tower located at Sta 1855+00 (MP 235.92), 60' east of NB exit ramp at Table Mesa Road TI
345 kV Transmission Line	Crosses I-17 at Table Mesa TI
Transmission Tower	Tower located at Sta 1860+00 (MP 236.01), 70' west of frontage road centerline, NW quadrant of Table Mesa Road TI
Transmission Tower	Tower located at Sta 1880+50 (MP 236.40), 300' west of SB I-17 centerline
345 kV Transmission Line	Within SB I-17 R/W from Sta 1965+00 to Sta 1976+20 (MP 238.00 to MP 238.21)
Transmission Tower	Tower located at Sta 1890+80 (MP 236.60), 170' east of SB I-17 centerline; within ADOT R/W
Transmission Tower	Tower located at Sta 1928+30 (MP 237.30), 170' east of NB I-17 centerline; within ADOT R/W
Transmission Tower	Tower located between SB & NB lanes of I-17 at Sta 1951+00 (MP 237.73), 500' west of NB centerline
Transmission Tower	Tower located at Sta 1967+00 (MP 238.04), 150' east of SB I-17 centerline
345 kV Transmission Line	Within R/W from Sta 1885+00 (MP 236.49) (SB) to Sta 1931+50 (MP 237.36) (NB); Crosses SB I-17 at Sta 1887+20 (MP 236.53)
345 kV Transmission Line	Crosses NB I-17 at Sta 2040+40 (MP 239.43)
345 kV Transmission Line	Crosses I-17 median centerline at Sta 2201+35 (MP 242.52)

El Paso Natural Gas	
Utility Type	**Location**
Gas Pipeline	Crosses I-17 at Sta 896+16 (MP 217.80)
20" Gas Pipeline	Crosses SB I-17 at Sta 2015+55 (MP 238.95)
20" Gas Pipeline	Crosses NB I-17 at Sta 2054+16 (MP 239.69)
20" Gas Pipeline	Crosses I-17 at Sta 2208+80 (MP 242.87) (south of Agua Fria River)
Gas	Crosses I-17 at Sta 2230+04 (MP 243.27)
Gas	Crosses I-17 at Sta 2289+75 (MP 244.40)

Southwest Gas	
Utility Type	**Location**
4" Gas	Crosses I-17 at Sta 786+47 (MP 215.72)
Gas	Crosses I-17 at Sta 1204+50 (MP 223.64)
1 1/4" Gas	Crosses I-17 NB at Sta 1657+00 (MP 232.20) and SB I-17 at 1656+00 (MP 232.18)

Qwest	
Utility Type	**Location**
Telephone	Crosses on Rose Garden Lane
Telephone	Crosses on Rose Garden Lane
Telephone (Underground)	Lines run from Sta 816+28 (MP 216.29) parallel to west R/W (4' and 8' offset from R/W, respectively) to Sta 833+06 (MP 216.61)
Telephone (Underground)	Lines run from Sta 860+00 (MP 217.12) parallel to west R/W (4' and 8' offset from R/W, respectively) to Sta 1312+99 (MP 225.70)
Telephone (Underground)	Lines run from Sta 1312+99 (MP 225.70) parallel to Lake Pleasant Road to Anthem TI, then lines parallel West R/W (4' and 8' offset from R/W, respectively) to Sta 1612+05 (MP 231.35)
Telephone	Crosses I-17 at Sta 1006+80 (MP 219.90)(Mtn Bell)

Telephone (Underground)	Crosses I-17 at Sta 1195+39 (MP 223.47)
Telephone (Underground)	Crosses I-17 at Sta 1489+00 (MP 229.05)
Telephone	Crosses I-17 at Sta 1541+00 (MP 230.0)
Telephone (Underground)	Crosses I-17 at Sta 1601+21 (MP 231.15)
Telephone (Underground)	Crosses I-17 at Sta 1612+05 (MP 231.35)
Telephone	Crosses I-17 at Sta 2201+24 (MP 242.72) (Mogollon Cable & Mtn Bell)
Telephone	Crosses I-17 at Sta 2203+93 (MP 242.77) (Mtn Bell)
Telephone	Crosses I-17 at Sta 2213+40 (MP 242.95)
Telephone	Crosses I-17 at Sta 2242+20 (MP 243.50)
Telephone	Crosses I-17 at Sta 2268+64 (MP 244.00)
Black Canyon City Water Improvement District	
Utility Type	**Location**
4" Water line	Crosses I-17 median centerline at Sta 2204+50 (MP 242.78)
2" Water line	Crosses I-17 median centerline at Sta 2217+00 (MP 243.02)
4" Water line (Abandoned?)	Crosses I-17 median centerline at Sta 2234+00 (MP 243.35)
4" Water line	East of I-17 approximately 130', alignment along east frontage road from Sta 2190+50 to Sta 2207+50 (MP 242.27 to MP 242.84)
City of Phoenix	
Utility Type	**Location**
12" Water Line (Abandoned)	West of I-17 between Loop 101 and Deer Valley Road; 115' west of I-17 median centerline
12" Water Line	From Sta 761+65 (MP 215.25) Lt. to Deer Valley Road; approximately 250' west of I-17 median centerline
12" Water Line	Crosses I-17 at Sta 772+81 (MP 215.46)
16" Water Line	Crosses I-17 at Sta 772+90 (MP 215.46)
10" Water Line (Abandoned)	Crosses I-17 at Rose Garden Lane
6" Water Line (Abandoned)	Crosses I-17 at Rose Garden Lane
8" Water Line (Abandoned)	Crosses I-17 at Rose Garden Lane
8" Sewer	Crosses I-17 at Sta 797+95 (MP 215.94)
Waterline	Crosses I-17 at Sta 801+15 (MP 216.00)
Cox Communications	
Utility Type	**Location**
AFO (Aerial Fiber Optic)	Crosses I-17 at Rose Garden Lane
Fiber Optic	Crosses I-17 north of Happy Valley Road TI (MP 218.1)
AFO (Aerial Fiber Optic)	Crosses I-17 at Sta 1105+80 (MP 221.79) with APS line
Fiber Optic	Crosses I-17 at Sta 1466+40 (MP 228.6)

1.5.5 Right-of-Way

Existing right-of-way widths vary along the corridor as detailed in Table 6. From the Rose Garden Lane TI north to the New River TI, right-of-way widths are generally in the range of 288 feet to 304 feet, widening out at each traffic interchange.

From the New River TI north to the Rock Springs TI, the northbound and southbound alignments diverge and right-of-way widths vary. At the Rock Springs TI, the alignments again become parallel and have a combined right-of-way width of 300 feet to approximately the Agua Fria River bridges. Right-of-way widths vary north of the river.

TABLE 6 – RIGHT-OF-WAY WIDTHS

From MP	To MP	From Station	To Station	R/W Width (feet)	Median Width (feet) (EOP to EOP)
215.41	218.91	770+00	954+50	288	60
218.91	219.67	954+50	994+56	330	60
219.67	220.42	994+56	1034+45	288	60
220.42	220.88	1034+45	1058+45	304	Varies (60 to 70)
220.88	227.76	1058+45	1422+00	304	76
227.76	228.07	1422+00	1438+00	754	76
228.07	228.10	1438+00	1440+00	304	76
228.10	228.41	1440+00	1456+00	754	76
228.41	228.27	1456+00	1501+70	304	76
228.27	230.77	1501+70	1581+00	249	76
230.77	231.85	1581+00	1638+00	302	76
231.85	233.12	1638+00	1705+00	Varies Typ. 96' West of SB centerline (cl) and 96' East of NB cl	Varies
233.12	233.41	1705+00	1720+00	Varies Typ. 96' West of SB cl and 100' East of NB cl	Varies
233.41	234.64	1720+00	1788+00 (NB)	Varies Typ. 96' West of SB cl and 200' East of NB cl	Varies
234.64	234.91	1877+00 (NB)	1802+00 (NB)	Varies Typ. 96' West of SB cl and 100' East of NB cl	Varies
234.91	235.41	1802+00 (NB)	1828+51 (NB)	Varies Typ. 96' West of SB cl and 200' East of NB cl	Varies
235.41	235.67	1828+51 (NB)	1842+00	496	160
235.67	237.00	1842+00	1912+50 (SB)	Varies Typ. 100' West of SB cl and 96' East of NB cl	Varies
237.00	237.37	1912+50 (SB)	1932+00 (NB)	Varies Typ. 200' West of SB cl and 96' East of NB cl	Varies

From MP	To MP	From Station	To Station	R/W Width (feet)	Median Width (feet) (EOP to EOP)
237.37	238.36	1932+00 (NB)	1984+40 (NB)	225	N/A
238.36	238.66	1936+87 (SB)	2000+00 (SB)	400	N/A
238.66	239.19	1984+40 (NB)	2028+00 (NB)	200	N/A
239.19	238.77	2000+00 (SB)	2006+00 (SB)	700	N/A
238.77	239.55	2006+00 (SB)	2047+00 (SB)	400	N/A
239.55	239.27	2028+00 (NB)	2032+00 (NB)	300	N/A
239.27	239.63	2032+00 (NB)	2051+38 (NB)	200	N/A
239.63	239.85	2047+00 (SB)	2062+95 (SB)	300	N/A
239.85	239.84	2051+38 (NB)	2062+50 (NB)	250	N/A
239.84	240.37	2062+50 (NB)	2090+41 (NB)	200	N/A
240.37	240.49	2062+95 (SB)	2096+46 (SB)	400	N/A
240.49	240.65	2090+41 (NB)	2105+00 (NB)	Varies	Varies
240.65	241.53	2105+00 (NB)	2151+38 (NB)	Varies Typ. 200' West of SB cl and 100' East of NB cl	Varies
241.53	241.59	2151+38 (NB)	2154+87 (NB)	Varies Typ. 100' West of SB cl and 125' East of NB cl	Varies
241.59	241.87	2154+87 (NB)	2169+65 (NB)	Varies Typ. 100' West of SB cl and 100' East of NB cl	Varies
241.87	242.20	2169+65 (NB)	2186+81 (NB)	Varies	Varies
242.20	242.62	2186+81 (NB)	2209+00	Varies	Varies
242.62	243.31	2209+00	2245+67	300	76
243.31	243.81	2245+67	2272+14	Varies	76
243.81	244.50	2272+14	2308+50	Varies	76
244.50	244.90	2308+50	2329+49	406	76

Adjacent major landowners include Arizona State Land Department, United States Automobile Association (USAA), Haugen Enterprises, Baha Properties LLC, Minnesota Title and Trust, and Harris Black Canyon Freeway Joint Venture LLC.

1.5.6 Structures

Existing structures along the corridor from SR 101L to the New River TI are listed in Table 7:

TABLE 7 – STRUCTURE CHARACTERISTICS

Structure Number	Route	Milepost	Structure Name	Year Built	Number of Spans	Maximum Span Length	Avail. Span Opening NB	Avail. Span Opening SB	Structure Length	NB I-17 Bridge Width	SB I-17 Bridge Width	Existing Median Width (E/P to E/P)	Obsolescence *
02087	17	214.48	Yorkshire Drive TI UP	1988	2	121	120	110	236				
02178	17	214.87	I-17 TI OP SB (over SFR, L101)	1998	3	183			479		73.25	-	
02179	17	214.88	I-17 TI OP NB (over SFR, L101)	1998	3	183			475	77.25			
02167	17	214.90	Ramp N-W (Level 3)	1998			99	119	967			-	
02171	17	214.90	Ramp S-E (Level 3)	2000			117	88	1386			-	
02165	17	214.90	Ramp E-N (Level 4)	1999			95	107	2158			-	
02169	17	214.90	Ramp W-S (Level 4)	2000			105	91	1735			-	
02180	17	215.00	I-17 OP at N. Frontage Rd SB	1998	1	140			144		70	-	
02181	17	215.00	I-17 OP at N. Frontage Rd NB	1998	1	140			144	70			
02136	17	215.48	Rose Garden Lane TI UP	1992	2	127	120	120	259		-		
00820	17	215.97	Deer Valley Road TI OP NB	1964	4	54			166	44	-	60	
01118	17	215.97	Deer Valley Road TI OP SB	1964	4	54			166		44		
00821	17	217.10	Pinnacle Peak Road TI UP	1964	4	69	67	67	234		-	60	F
00822	17	218.01	Happy Valley Road TI UP	1964	4	70	68	68	238		-	60	F
00285	17	219.11	Skunk Creek Bridge SB	1947	8	35			268		42.0	60	
00790	17	219.11	Skunk Creek Bridge NB	1963	8	35			269	42.0	-		
01078	17	219.11	Skunk Creek Bridge East FR	1963	8	35			269		-	-	
01079	17	219.11	Skunk Creek Bridge West FR	1963	8	35			269		-	-	
01400	17	220.38	CAP Bridge NB	1977	1	84			86	42.0	-	60	
01401	17	220.38	CAP Bridge SB	1977	1	84			86		42.0		
01402	17	220.38	CAP Bridge East FR	1977	1	84			86		-	-	
01403	17	220.38	CAP Bridge West FR	1977	1	84			86		-	-	
00824	17	223.99	SR74 Carefree Highway TI UP	1964	4	79	77	77	251		-	76	F
01289	17	225.50	Pioneer Road TI UP	1968	2	110	107	107	224		-	76	
00304	17	226.95	Deadman Wash Bridge SB	1948	4	35			128		42	76	
00905	17	226.95	Deadman Wash Bridge NB	1966	4	35			130	38	-		
	17	227	Proposed Daisy Mtn. TI UP	Future			96	96			-	76	
00932	17	229.09	Anthem Way TI UP	1999	2	107	96	96	220		-	76	
01290	17	231.40	New River Bridge NB	1968	9	40			347	42	-	76	
01291	17	231.40	New River Bridge SB	1968	9	40			347		42		
01292	17	232.00	New River TI OP NB	1968	3	60			159	38	-	76	
01293	17	232.00	New River TI OP SB	1968	3	59			145		38		
01294	17	235.94	Table Mesa TI UP SB	1968	3	70		59	151			Var.	
01295	17	235.94	Table Mesa TI UP NB	1968	3	70	59		161			Var.	
00967	17	238.20	Moore's Gulch Bridge NB	1967	3	73			195	38		Var.	
00339	17	238.60	Moore's Gulch Bridge SB	1950	3	67			178		31.8	Var.	

Structure Number	Route	Milepost	Structure Name	Year Built	Number of Spans	Maximum Span Length	Avail. Span Opening NB	Avail. Span Opening SB	Structure Length	NB I-17 Bridge Width	SB I-17 Bridge Width	Existing Median Width (E/P to E/P)	Obsolescence *
00968	17	239.20	Little Squaw Creek Bridge NB	1967	4	85			315	32.5		Var.	S
00340	17	239.55	Little Squaw Creek Bridge SB	1950	3	67			179		31.8	Var.	S
00969	17	242.10	Rock Springs TI UP NB	1967	1	105	101		109			Var.	
00970	17	242.25	Rock Springs TI UP SB	1967	1	105		101	109			Var.	
00863	17	242.98	Mud Springs UP (Grade Separation)	1965	2	110	107	107	224			76	
01807	17	243.34	Agua Fria River Bridge NB	1980	4	90			363	42		76	S
01808	17	243.34	Agua Fria River Bridge SB	1980	4	90			363		42	76	S
00764	17	244.37	Black Canyon TI OP NB	1964	3	36			97	38		76	F
00765	17	244.37	Black Canyon TI OP SB	1964	3	36			97		38	76	F

* **F** denotes Functional Obsolescence
S denotes Structural Deficiency

1.5.7 Geotechnical

1.5.7.1 Physiographic Setting

The section of the I-17 alignment being studied is located between the northern Phoenix area and Black Canyon City in central Arizona. This corridor is located within the northern limits of the Basin and Range Physiographic Province (Basin and Range) and the southern limits of the Arizona Transition Zone. The Basin and Range is characterized by rugged isolated fault-bounded mountain ranges separated by broad alluvium-filled valleys. Mountain ranges in the Basin and Range generally trend in a north to northwesterly direction. The Transition Zone separates the Basin and Range from the Colorado Plateau to the north. This zone is characterized by rugged mountains of igneous, metamorphic and deformed sedimentary and volcanic rocks of Precambrian age, with erosional remnants of Paleozoic age and an absence of Mesozoic and Cenozoic rocks.

The project alignment begins at MP 215 within the valley floor of Deer Valley at an approximate elevation of 1400 feet. The alignment proceeds directly north between the Deem Hills to the west and the Union Hills to the east into the Biscuit Flat. Carefree Highway (SR 74) intersects the I-17 alignment within the Biscuit Flat, just south of the North Union Hills, which consist of the Rifle Range and Deadman Wash Range. The alignment continues north into the alluvial valley of the New River, west of Daisy Mountain. The corridor circumvents the town of New River, located at an approximate elevation of 2,000 feet. At approximate MP 234, immediately east of Table Mountain, the northbound and southbound lanes of I-17 divide to follow two different alignments. The I-17 alignment begins to traverse mountainous terrain that is wedged between the southwest extension of the Bradshaw Mountains in the Castle Creek Wilderness Area and the New River Mountains. The two alignments then traverse Moore Gulch at approximate MP 239 and join back together just north of the Rock Spring TI at MP 242. The project alignment continues north towards Black Canyon City and ends at the Black Canyon TI, also at an approximate elevation of 2,000 feet.

The main drainage systems within these areas are the Agua Fria River and New River, which flow from the northeast to the southwest. From north to south, the major tributaries to these rivers that are paralleled and traversed by the project corridor are Little Squaw Creek, Deadman Wash and Skunk Creek. Numerous tributaries to these creeks also traverse the alignment, predominantly in a northeast to southwest direction. In addition, the project alignment traverses the Central Arizona Project Canal at MP 220.4.

The local vegetation consists of various desert grasses, mesquites, palo verdes, creosote, saguaros, and other varieties of small cacti.

1.5.7.2 Site Geology

In general, the hills and small mountains traversed by the project alignment are composed of Precambrian metavolcanic and granites and Tertiary interbedded volcanic and sedimentary rocks, while the valleys are filled with Quaternary deposits. Near New River, the valley fill consists of well-stratified lake and poorly sorted stream deposits.

The generalized geologic units encountered along the project alignment consist of Precambrian metavolcanic rocks and granite intrusions, an interbedded sequence of Tertiary basalts and tuffs, Quaternary/Tertiary pediment deposits and Quaternary surface deposits.

1.5.7.3 Pavement Conditions and As-Built Construction

Except for select localized areas in the shoulder, the existing pavements along both northbound and southbound lanes of I-17 are in good to very good condition throughout the length of the project alignment. In general, the pavements do not display potholes, rutting, corrugation, depressions, swells, and/or slippage cracking. The shoulder pavement segment between MP 218.0 and MP 223.0 is the segment with visible signs of distress. In this segment transverse cracks were observed on the outside shoulder both in the northbound and southbound sections. Additionally some damage was observed in the mainline pavement near the Skunk Creek Bridge located at approximately MP 219. All the cracks, however, are sealed. In reviewing ADOT Pavement Management System Information it is apparent that neither cracking nor rutting is a concern in the study section.

Review of ADOT's Pavement Management System Information shows that both the northbound and southbound segments have received varying surface treatments. Table 2 in the project geotechnical assessment report summarizes the treatments that have been applied to the existing project alignment since its construction.

Based on the review of the as-built plans, the existing pavement section varies from 0.5 inches of friction course over 11.0 to 5.5 inches of bituminous materials over 4 to 12 inches of aggregate base over 6 to 24 inches of select material. Any treatment of the subgrade is not apparent from the review of the as-built plans.

1.5.7.4 Roadway Cuts

With the exception of the potential geological hazards, it should be noted that no recent major wedge failures or slope deterioration were noted or observed in the field at the existing near vertical cuts (Table 8), which appear to have performed well. No recent major failure scarring was visible on the road cuts. Slopes that have established vegetation show little or no history of erosion or mass movement. In areas where rock fall have been noted, the existing pavement surface has been dented and other wise very slightly damaged.

TABLE 8 – ROADWAY CUTS

Milepost (MP)	Geologic Material	Observed Potential Geological Hazards
Northbound MP225 to MP227	Precambrian metavolcanics, tertiary volcanics and sediments	Precambrian Metavolcanics – small scale wedge failures Tertiary Volcanics and sediments – sloughing, very small scale wedge failures along shoulder and center lane
Northbound MP232 to MP237	Quaternary eolian and alluvial sediments	Moderate to large scale sloughing, some rock fall
Northbound MP241 to MP242	Tertiary sandstone and tuff	Rock fall along center lane
Southbound MP244 to MP242	Quaternary eolian and alluvial sediments	Heavily eroded, undercutting
Southbound MP240 to MP238	Quaternary alluvial sediments	Rock fall on both center lane and shoulder (large cobbles and medium to large boulders), seep on center lane over slough material (refer to photos)
Southbound MP238 to MP236	Quaternary eolian and alluvial sediments	Sloughs on both center lane and shoulder, right of way on road adjacent to I-17 is being under cut and cut has eroded back to guard rail (refer to photos)
Southbound MP235 to MP234	Precambrian phyllite/fine grained muscovite schist	Large scale wedge failure
Southbound MP227 to MP225	Precambrian metavolcanics, tertiary volcanics and sediments	Precambrian Metavolcanics - small scale wedge failures Tertiary Volcanics and sediments – very small scale wedge failures, Rock fall along shoulder and center lane

Ditches and containment walls appeared to be completely full in most cases and should be cleaned out more regularly in order to decrease rock material from making its way onto the roadway. In addition, larger catchment areas and alterations in slope geometry should be considered during final design.

1.5.7.5 Roadway Fills

The roadway alignment typically is constructed on two approximately three- to five-foot high embankments divided by an intermediate ditch. These fill sections increase to heights in excess of 25 feet at select locations near drainage/canal crossings. Existing fill slopes along the alignment are approximately 6(h):1(v) at the start of the study segment but increase significantly by the end of the study segment. The slopes appear to be stable with a significant amount of desert vegetation growing on them. However, minor to moderate, rain-induced surface erosion can be observed locally along the project corridor.

1.5.8 Lighting

Existing lighting consists of high mast system TI lighting and pole-mounted luminaires through the I-17/ SR 101L TI. North of the system TI, lighting is present at exit and entrance ramp gores along the mainline at every interchange except the Table Mesa TI.